

EMD Electronics is the electronics
business of Merck KGaA, Darmstadt,
Germany in the U.S. and Canada.

EMD
ELECTRONICS

ELECTRONICS STARTS WITH US

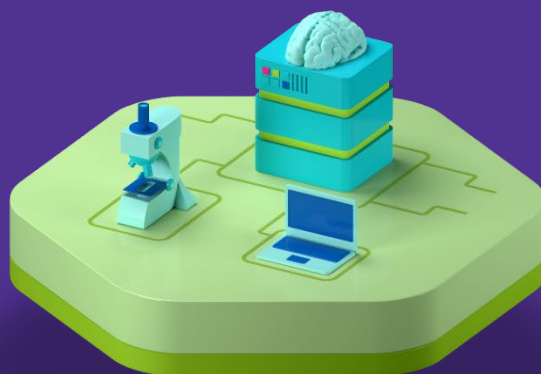
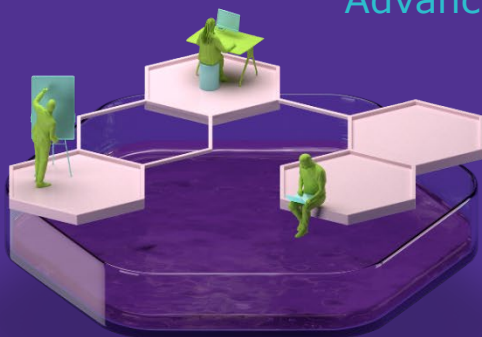
We are creating the next generation
of materials, equipment and services
that will advance our world.



We have **3 HIGH-TECH**
BUSINESS sectors competing
in attractive markets

Electronics

Advancing Digital Living



Life Science

Solving the toughest
problems in Life Science

Healthcare

As One for Patients

Key figures

63,000

Employees worldwide

21.0

Sales (€ billion)
in 2023

2.4

R&D (€ billion)

Founded

65

Countries

1668



We are **UNIQUE**

Every day, our nearly **63,000** employees work in **65** countries to make a positive difference to millions of people's lives by creating more joyful and sustainable ways to live.



**EMD
SERONO**

**MILLIPORE
SIGMA**

**EMD
ELECTRONICS**

In United States and Canada, we operate
as EMD Serono, MilliporeSigma and EMD Electronics.



Over **350** years of curiosity & **100** years of experience in Electronics

1668

Friedrich Jacob Merck lays the **foundation** for our company

1904

Start of **liquid crystal** research

2003

Entry into **targeted cancer therapies**

2010

Acquisition of **Millipore**

2015

Acquisition of **Sigma-Aldrich**
(SAFC HiTech business)
Advanced Deposition with a focus on
Metalorganic Precursors
& **Ormet Circuits**
Advanced packaging and conductive
pastes

2018

350th anniversary Opening of the new
Innovation Center in Darmstadt

2023

Acquisition of **M Chemicals**
Advanced Deposition with focus
on high-K

1827

Emanuel Merck begins production on an
industrial scale

1995

Merck KGaA, Darmstadt, Germany,
goes public

2007

Acquisition of **Serono**

2014

Acquisition of **AZ Electronic Materials**
Advanced Patterning & Focus on Spin-on
Materials

2017

Regulatory approvals for drugs in the
areas of cancer and chronic progressive
diseases of the immune system

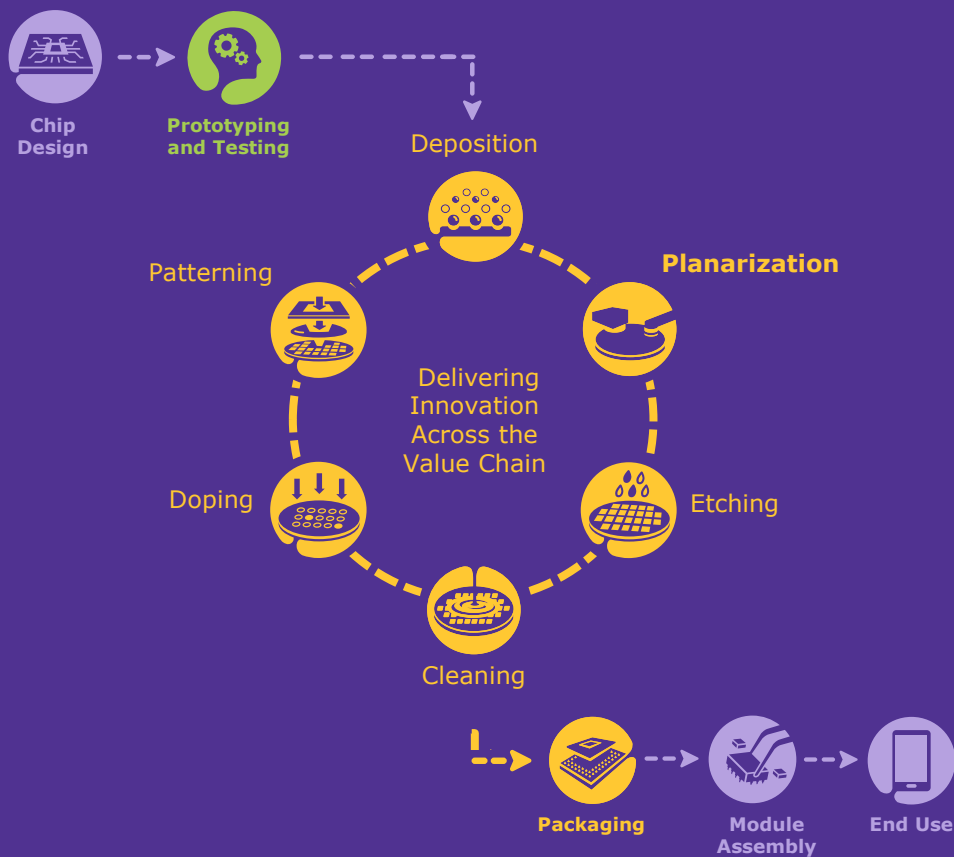
2019

Acquisition of **Versum Materials**
Advanced Deposition with focus on
Dielectrics, Etching, Cleaning, Doping,
Gases, CMP
& **Intermolecular**
Prototyping & Testing with strong focus
on Deposition



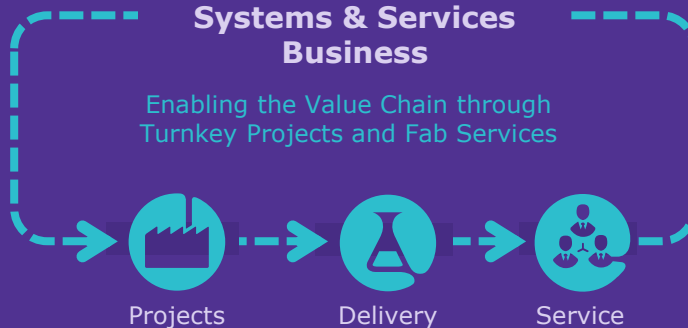
WHAT WE OFFER

We are a leading provider of materials and delivery solutions for the semiconductor industry



Steps in our Delivery Systems & Services Business

Enabling the Value Chain through Turnkey Projects and Fab Services



● Silicon Valley Materials Science Hub

● Semiconductor Materials Offering

● Delivery Systems & Services Offering



OUR BROAD PORTFOLIO

We serve our customers at every step of the semiconductor industry value chain



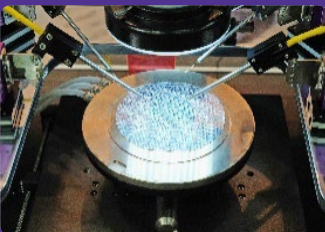
Thin Films

- Spin-on Dielectrics
- Organosilanes
- Organometallics



Specialty Gas

- Doping
- Etching
- Cleaning
- Deposition



Planarization

- STI & Advanced Oxide Slurries
- Copper Bulk Slurries & Copper Barrier Slurries
- Tungsten (W) and new metals (Co, Mo) Slurries
- Post CMP (pCMP) Cleans
- Wafer Polishing Slurries



Patterning

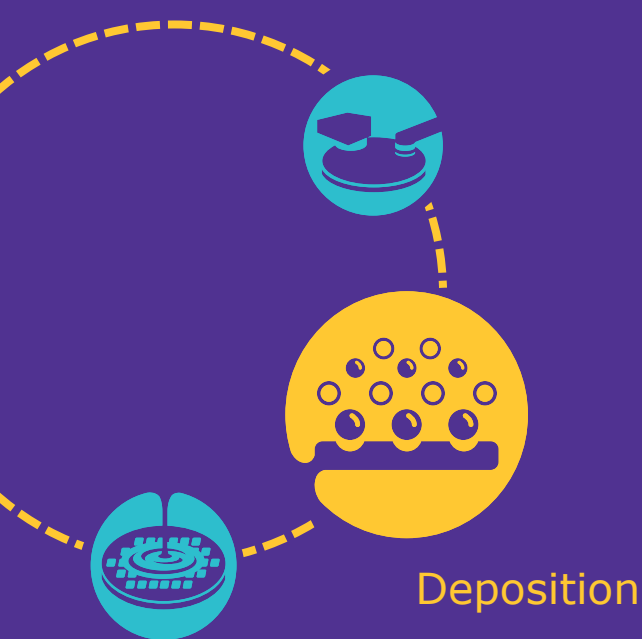
- Photoresists
- Pattern Enhancement Materials
- Process Enhancement Materials
- Advanced Cleaning Solutions (Surface Preparation & Cleans)
- Innovative Products (EUV PR, DSA, MHM, etc.)



Delivery Systems & Services

- Turnkey Projects
- Delivery Systems
- Fab Services





THIN FILM PRODUCT LINES

Your go-to innovation partner with the most complete portfolio

Spin-on Dielectrics

- Existing: Spinfil® and Ancillary, RS series,
- New: Spinfil® and RS series next gen, Multi-Color Materials, PSOD

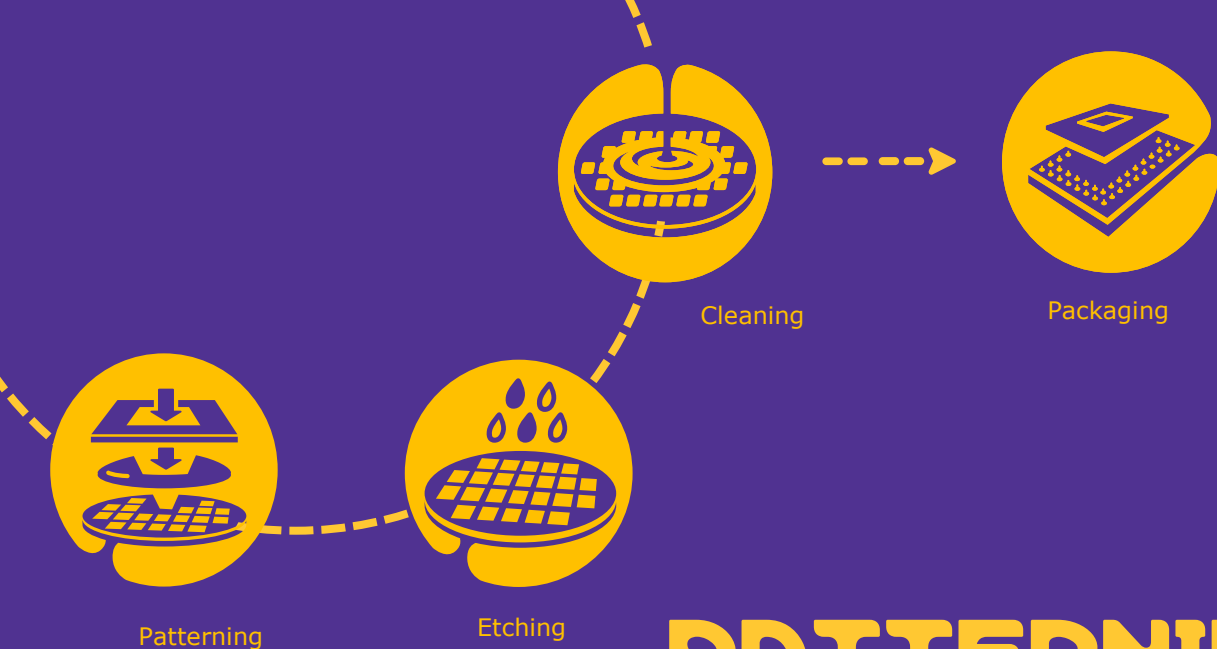
Organosilanes (PECVD, ALD, and FCVD)

- Existing: AP-LTO® and AP-LTN® product lines, PDEMS® franchise for Structure former and Porogen, BTBAS/3DMAS/TEOS/3MS/4MS/TSA
- New products: new ALD precursors; PECVD based advanced Low-k; new FCVD

Organometallics (CVD and ALD)

- Existing: CVD & ALD precursors to deposit metal, nitride and oxide thin films used in logic and memory
- New: Precursors for advanced interconnects, liner/barriers and dielectrics





PATTERNING PRODUCT LINES

High-performance materials for
optimum wafer results

***Lithography Products**

- g/i-line, KrF, ArF and EUV resists and DSA
- BARC/TARC/SOC/MHM ancillary materials
- Rinse, EBR and developers

Etch and Cleaning Products

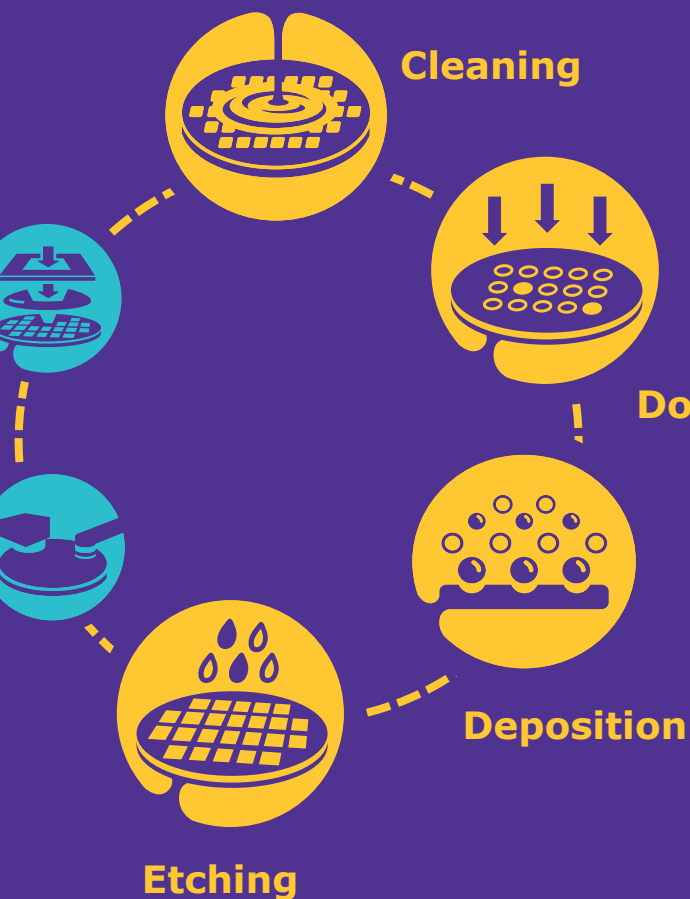
- Post etch residue removers – metal-based processes
- Photoresist removers
- Selective etch products for multiple applications

Packaging Materials

- Thick film resists for interconnects and photosensitive dielectrics
- Associated removers
- Gap fill, metallization materials

*Includes Photoresists, Patterning Enhancement Materials, Process Materials, EUV Materials, and DSA (Directed Self-Assembly).





SPECIALTY GASES PRODUCT LINES

Recognized leader in
electronics specialty gases
and the end-markets

Cleaning

- NF_3 , ClF_3 , C_2F_6

Doping

- PH_3 , AsH_3 , POCl_3 , B_2H_6 , BF_3 , D_2

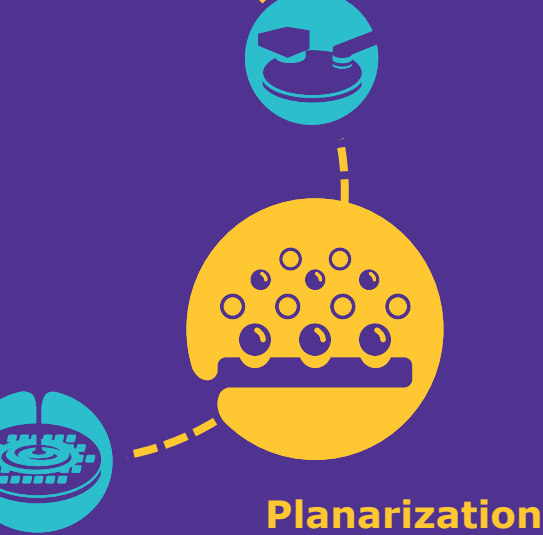
Deposition

- WF_6 , SiF_4 , SiH_2Cl_2 , SiCl_4 , SiHCl_3 , C_2H_2 , BBr_3 , N_2O , NH_3 , NI , CO_2 , H_2Se , GeH_4

Etching Gases

- C_4F_6 , CH_2F_2 , C_4F_8 , CH_3F , CHF_3 , CF_4 , C_3F_6 , BCl_3 , HCl , F_2N_2 , BrF_3 , SF_6 , Xe





PLANARIZATION PRODUCT LINES

Global leader in Chemical
Mechanical Planarization
(CMP) Technology

FEOL Dielectrics

- Existing: STI series for Oxide, Stop on Nitride, Stop on Poly CMP applications
- New: High Performance Dielectric (HPD) series for advanced technology requirements (High Rate, Tunable Selectivity, ultra low defect)

BEOL Metal Interconnect

- Bulk Copper slurries for high throughput process and tunable topography
- Copper Barrier slurries to meet current and next gen barrier metals

W

- Existing: W5880 Bulk W CMP slurry with tunable selectivity to dielectric with tunable topography
- New: High Throughput High Selective W CMP slurry with excellent dishing performance

Advanced Packaging

- High Performance Nitride (HPN) series for High Rate Nitride selective to Oxide/Metal layers
- High Rate Bulk Cu/Low dishing Copper slurries
- High Rate Copper Barrier slurries for optimum throughput

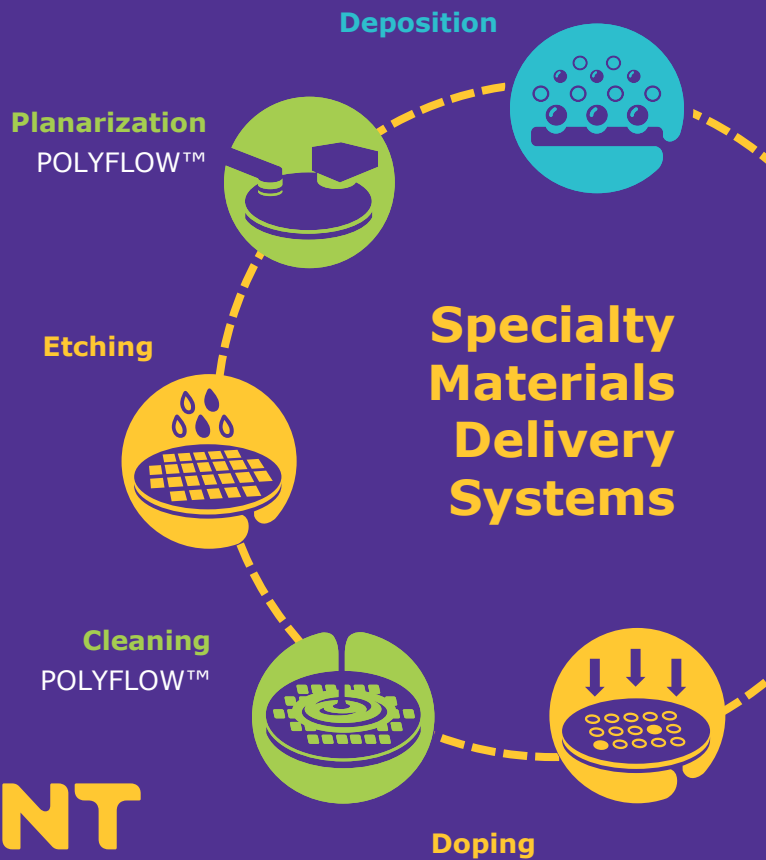
Bare Silicon Polishing

- Mazin and Syton Bulk and Intermediate Si Polish slurries

Post CMP Clean

- Copper and Dielectric Post CMP cleaning chemistries





EQUIPMENT PORTFOLIO

Industry standard for cost-effective,
fab-wide gas and chemical supply and
services



Specialty chemical delivery

CHEMGUARD® | CHEMKEEPER®



Specialty gas delivery

GASKEEPER®



CMP slurry delivery

FLOWMASTER® CMP & POLYFLOW™
PARTS/CARRIER CLEANERS



We are a **TRUSTED**
LEADING PLAYER
in the safe delivery of hazardous materials

- **30+ years of experience** with a flawless safety record and full interoperability.
- Operational and project execution excellence with **18 million operating hours** and **99.9997% uptime** of our equipment.
- **Global operations infrastructure** for worldwide supply.
- **Tailored offerings** from regional manufacturing sites.
- **Dedicated teams** serving top-tier customers.
- **Collaborative new product development** with OEMs (Original Equipment Manufacturer) and IDMs (Integrated Device Manufacturer).
- Enabling our customers to **run safely** with **operational excellence**.



Winning in
the **FAB**
EQUIPMENT
market!



UNLOCK THE POWER OF DATA & ANALYTICS

We advance Semiconductor Manufacturing with Data Collaboration and Advanced Analytics

Benefit from data insights in...



Quality

Increase in-fab performance and reduce variations



Sustainability

Estimate the product carbon footprint at batch level for select products and get suggestions to reduce the impact



R&D

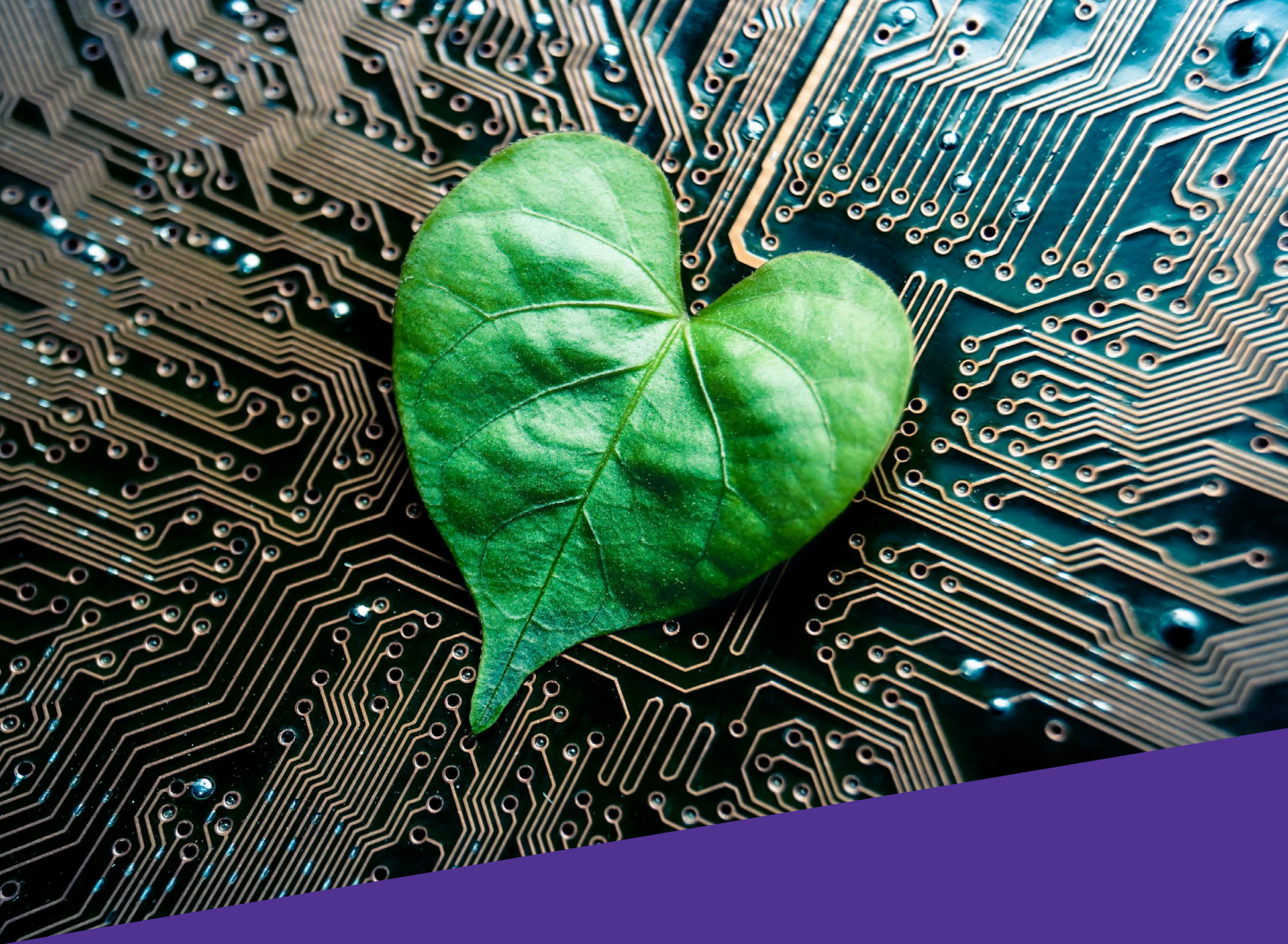
Solve ramp-up challenges within weeks



Supply Chain

Receive insights for resiliency on complex scenario planning and external risks



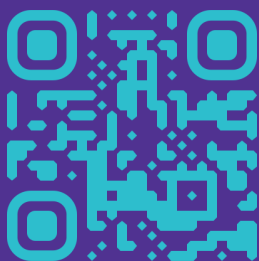


TOGETHER

Advancing Sustainability

With **innovation** and our high-tech materials, we enable more sustainable solutions tailored to our customer's needs while creating a **greener** and more environmentally responsible future for the semiconductor industry.





**We are the company behind the
companies advancing digital living**

Find more about our complete integrated
solutions and data-driven processes

